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ABSTRACT

There is an increased need for state and private sector support to expand the capacity of California's community colleges and universities to graduate the number of engineers and technicians necessary for the projected expansion of the state's high technology industries. Current estimates indicate that there will be a national shortfall of 22,000 electrical and computer engineers per year through 1987, due primarily to a lack of educational resources to accommodate qualified applicants. Faculty positions in engineering cannot be filled largely because of uncompetitive starting salaries, and laboratory equipment is outdated and in inadequate supply. In spite of the current economic downturn, the needs of the high technology industry for qualified personnel remain strong. To meet these needs, both industry and government must share responsibility with education to ensure an adequate supply of graduates. Industry is responding to this need in a variety of ways. The American Electronics Association, for example, is encouraging each of its member companies to give 2% of its research and development funds to engineering education and is providing the resources to allow its representatives to serve on government, educational and advisory boards. To supplement industry support, government must maintain an adequate funding base for occupational education or accept the erosion of the quality and level of services. Government can also be the catalyst to encourage the partnership among industry, education, and government. (HB)

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EDUCATION FOR CALIFORNIA'S CHANGING ECONOMY

Pat Hill Hubbard

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As a member of the WICHE Technical Manpower Council I am especially pleased to be here today to take part in this conference designed to communicate to you--legislators, educators, business and industry people--the recommendations that we believe are needed to bring about changes in technical education in the state.

There is an increased need for state and private sector support to expand the capacity of California community colleges and universities to graduate the numbers of engineers and technicians necessary for this state's high tech industries to fulfill the promise to expand 47.6% in the 1980's. We also need increased support for math, science, and computer education in grades K-12 to help ensure a steady supply necessary to perform in an increasingly complex technologically-based work place.

AEA has just completed a national survey of its member's technical human resource needs through 1987. This data projects a shortfall of electrical and computer engineers of up to 22,000 a year through 1987. The cause is not a lack of competent applicants. Currently one out of three students is denied admission to engineering study. The problem is a lack of educational resources to accommodate them--primarily of faculty and lab equipment. While we need 1,000 new engineering faculty nationally each year, we produce only 450. One California college has one-thrid of its full-time engineering positions unfilled because of low starting salaries of $19, 044. Such salaries do not attract any but the wealthy, those who have married well, or those, who like religious converts, have given up all worldly goods.

Laboratory equipment is outdated and little is available to teach new technologies. The California community colleges have just completed a study of equipment needs. With 67 of the 107 colleges reporting, in engineering and electronic technology programs it is estimated that $13 million is needed to upgrade labs. For the entire system, it is reasonable to set the cost at $20 million. The study found that 60 percent of California community colleges use teaching equipment which is 6 to 14 years of age. Similarly, the School of Engineering at San Jose State University reports that over 80 percent of its instructional equipment is 20 years old or more. The CSUC budget for replacement of instructional equipment provides funding for less that 2 percent of the annual total replacement cost. This requires a 59 year life cycle for such equipment.

The low salaries of California faculty--lower by comparison to colleges in the Southwest by some $4,000 (average Assistant Professor's salary in the Southwest is $26,592 compared to the average in the CSUC system of $22, 896)--the inability to upgrade teaching labs, the concern about quality--all fit a picture of a system that is unable to expand capacity to meet the needs of the State's high tech industry, at least presently.

Out of 13 CSUC campuses, six will be "impacted" 1983-84. Impaction means that a college has received more applicants in the first month of admissions than it has capacity to fill for the entire year. Impaction allows colleges to set higher standards of admission. Those effected in 1983-84 will be Northridge, Pomona, San Diego, San Jose, San Luis Obispo, and Sacramento.

The needs of the high tech industry remain strong--in spite of the economic downturn. Our latest AEA survey projection data shows 405 companies projecting an annual compound growth rate (ACGR) through 1987 for electrical engineers of 12.2% or a total growth over five years of 77.4%; software engineers are projected to grow at 16.5% ACGR or total 5 year percentage of 114.3%. Juxtapose these needs for combined electrical and computer engineers for just the 405 companies against what the whole State of California produced last year, we come up with a shortfall of 1,451. And AEA alone has over 1,200 member companies member companies in California. The need is clearly there. The questions remains--what is the responsibility of industry and government to ensure that an adequate supply of graduates is available to meet these needs?

Industry is already responding to the problem. Two years ago AEA established a goal for each of its member companies to give 2 percent of R & D expenditures to engineering education. We have established around the country industry committees of corportate levle people. These groups have raised $2.3 milion through AEA's Foundation and another $142, 031, 901 from comparies which have gone directly to universities. Our 1983 goal is to raise another $2.5 million. AEA compnaies have funded 18 fellowships to California universities to provide fellowship-loans to U.S. citizens to pursue graduate studies and teach electrical or computer engineering.

In addition to money, we believe industry's responsibility is to deliver to educational and government plannners data in terms of numbers and kinds of workers companies will need. It is towards this end that we have recently repeated our Technical Employment Projections survey. The report will be

out in July.

Furthermore, AEA makes time available for me to serve as a member of the California Community Colleges Board of Governors, to chair a Voc Ed Committee to that Board, and to chair the Joint Committee on Vocational Education for the State of California--a combination of Board of Governors and State Department of Education representatives. Through these bodies we are trying to address improvement in three key areas of Occupational Education; advisory committees, evaluation of Voc Ed programs, and the competency and currency of occupational instructors. The public and legislators have all made the connection we have been trying to get them to make for a long time--that jobs are directly related to the delivery of education and training by community colleges. In this time of high unemployment, the concern about the job situation is translating itself into a desire to improve the educational delivery system that trains and educates people for employment. It is my belief that legislative concern with occupational education is driving reform of the whole system.

Reform is one problem I see in relation to government's present role. Seldom does governemnt seek solutions in cooperation with industry and education. For example, I spend at least 20 percent of my tiem currently trying to prevent bad reform--initiated from well-intentioned law makers--from occuring. More bills were introduced on Voc Ed reform for California Community Colleges on day a couple of months ago than in the prior two years combined. I am also concerned about the growing separation of funding from the basic core of the system into "separate" pots of money, each with a variety

of regualtions and requirements. We need to fund adequately the base of occupational education or we erode the quality and level of services beyond a healthy point. "Special" funding, while helpful, can contribute to depletion of time and energy of the core resources.

In 1982-83 1.5 million people enrolled in California's 107 community colleges. 75% of these enrolled in some kind of vocational training: 40% were seeking to improve their jobs, 48% received higher wages, 52% improved both job and pay, 32% acquired a major new job skill, 27% improved their present job skills.

What then is governemnt's role? Historically it has been to provide budgetary funds to guide educational resources. Our position at AEA is that government can be a catalyst to encourage the partnership between industry, education, and government. One way to go about this is to enact positive tax policies that encourage companies to "invest" in education. O'Connell's AB430, designed to provide tax incentives for companies to donate new equipment to two and four year California colleges is one example. AEA is working with CSUC on a long-term plan to increase salaries for engineering professors as well; legislative assistance will be absolutely necessary to accomplish this.

Community Colleges are the basic training and retraining units of the State. We must be concerned that in an effort to improve the employment situation, we don't "do in" the system by starving its basic funding source,

by placing in charge of curriculum those least likely to have had experience with it. New groups, such as the PIC's, JPTA, or even old groups like EDD are being suggested as government's mechanisms for improving vocational education. Doing it differently is not, I suggest, necessarily doing it better. Government and industry should work with education to reform itself. We should be cautious in driving that improvement

I appreciate the opportunity to be with you today in an effort to encourage the very worthwhile goal of an industry, education, partnership for excellence in education.

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